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THE CONSERVATION AND CULTIVATION OF MEDICINAL PLANTS.

By Henry Kraemer.

It has been estimated that if the destruction of forests, by cutting and fires, continues in the Southern Appalachian region, in ten years they will be beyond reclamation. It seems not improbable also that if the gathering of native herbs and drugs continues, as in the Blue Ridge districts of North and South Carolina and Tennessee and in other parts of this country, that our principal medicinal plants will in a corresponding number of years be well nigh exterminated, unless some measures are taken either to conserve them, or cultivate them in this and other localities.

Some ten years ago the statement was made that one firm alone employed 30,000 collectors who scoured the fields and mountains for crude drugs and herbs. My own inquiries regarding certain plants seem to indicate that some of our well-known plants are already nearly exterminated, as, for example, spigelia. In 1897, while at Northwestern University, I was furnished with a spurious spigelia which, however, proved to be of special interest to me on account of the presence of internal cells containing calcium carbonate. I endeavored for several years to procure specimens of the living plant, *Spigelia Marylandica*, but was neither able to find it myself nor to procure specimens through correspondence in localities where I supposed it to be abundant. In Linné's time the plant was apparently abundant in Maryland, and, according to Gray, it was found as far north as New Jersey, yet Dr. David M. R. Culbreth

tells me that the plant is exceedingly rare in Maryland. I finally obtained some beautiful flowering specimens from Mr. Joseph Jacobs, of Atlanta, Ga., and I am inclined to think that *Spigelia Marylandica* does not grow in abundance north of the Gulf States and is probably not very abundant even there.

Dr. True, of the U. S. Department of Agriculture, in a paper at the last meeting of the American Pharmaceutical Association, called attention to the fact that the root of an entirely different plant was furnished him for "pink root" or spigelia. This substitute, according to Dr. True, is the rhizome of *Ruellia ciliosa*, and is apparently the same rhizome which was furnished me and which Greenish has described and illustrated in *Pharm. Jour.*, 1891 (March 14), p. 839.

Other medicinal plants are likewise becoming scarce, as those yielding serpentaria, senega, cypripedium, etc. Attention has been directed to the growing scarcity of some of these drugs by various writers in the past twenty-five years. (See this JOURNAL, 1900, p. 184.) One locality after another is exhausted in the collection of vegetable drugs, and while fortunately new fields have been discovered in some instances, still the vast areas on which we depended for certain products are becoming more and more reduced.

The conservation of useful plants is imperative, and when we see, as in the case of coca and cinchona, that man by selection and cultivation has not only conserved but improved certain plants, it is important that we study our medicinal plants in their natural surroundings until we have gained such a knowledge of the peculiar requirements of each that they may be cultivated successfully and thus conserved before they are exterminated. It is true that from single specimens of many of our economical plants a nation's wealth might be replenished in case of necessity. But this could only be realized providing we understood the peculiar conditions under which they develop. It has been stated that the eucalypts are less easily propagated than most other forest trees, and yet in certain portions of the United States they are more extensively cultivated than any other exotic tree, simply because the peculiar climatic conditions under which the several species develop are fairly well understood. It is due to Baron von Mueller and M. Ramel, who, fifty years ago, started to introduce this interesting genus in various civilized portions of the globe, that it is to-day one of the most extensively cultivated and most valuable genus of forest trees.

ECONOMICAL PLANTS OF MEDICINAL VALUE WHICH ARE CULTIVATED.

While in this country we are cultivating useful plants from foreign countries we are also cultivating at the rate of between 100 and 200 of our native plants yearly either for food or ornamentation. Many of the latter plants are also of medicinal interest. It is astonishing to see how many of them are listed in the catalogues of nurserymen. The following list includes some of the deciduous and evergreen trees; the botanical names of the plants and the synonyms of the drugs yielded by them both being given. I make mention of these, as for a number of years I have been receiving inquiries regarding the kinds of plants that are adapted for cultivation to certain localities and where they may be obtained. The buckeye or American horse-chestnut (*Aesculus glabra*); the European horse-chestnut (*Aesculus hippocastanum*); black birch bark (*Betula lenta*); chestnut (*Castanea dentata*); Judas tree (*Cercis Canadensis*); dogwood (*Cornus Florida*); persimmon bark (*Diospyros Virginiana*); American or white ash bark (*Fraxinus Americana*); black ash bark (*Fraxinus sambucifolia*); butternut (*Juglans cinerea*); black walnut (*Juglans nigra*); tamarac bark or American larch (*Larix Americana*); spice bush or fever bush (*Benzoin benzoin*); sweet gum bark (*Liquidambar styraciflua*); tulip tree bark (*Liriodendron tulipifera*); sweet bay or magnolia bark (*Magnolia glauca*); pride of China (*Melia Azedarach*); ironwood (*Ostrya Virginiana*); balsam poplar (*Populus candicans*); white poplar (*Populus tremuloides*); hop tree or wafer ash (*Ptelea trifoliata*); mountain ash (*Pyrus Americana*); apple tree bark (*Pyrus malus*); white oak bark (*Quercus alba*); red oak bark (*Quercus rubra*); black oak bark (*Quercus tinctoria*); white willow (*Salix alba*); black willow (*Salix nigra*); sassafras (*Sassafras variifolia*); elm bark (*Ulmus fulva*); prickly ash (*Xanthoxylum Americanum*); hemlock spruce (*Tsuga Canadensis*); juniper (*Juniperus communis*); savine (*Juniperus sabina*); white pine (*Pinus strobus*); eucalyptus (*Eucalyptus globulus*); red gum (*Eucalyptus rostrata*); wild cherry (*Prunus serotina*); orange and lemon (species of *citrus*); tree of heaven (*Ailanthus glandulosa*).

Some of the drug-yielding deciduous and evergreen shrubs that are cultivated are swamp-, bush- or tag-alder (*Alnus serrulata*); barberry bark (*Berberis vulgaris*); Jersey tea (*Ceanothus Americanus*); fringe tree (*Chionanthus Virginica*); sweet fern (*Comptonia peregrina*); red osier bark (*Cornus stolonifera*); English hawthorn (*Cratæ-*

gus oxyacantha); mezereum (*Daphne mezereum*); American burning bush or wahoo (*Euonymus atropurpureus*); broom tops (*Cytisus scoparius*); witch hazel (*Hamamelis Virginiana*); hydrangea (*Hydrangea arborescens*); black alder (*Ilex verticillata*); wax myrtle or bayberry (*Myrica cerifera*); peach (*Amygdalus Persica*); buckthorn berries (*Rhamnus cathartica*); buckthorn bark (*Rhamnus frangula*); cascara sagrada (*Rhamnus purshiana*); sumach (*Rhus glabra*); rose flowers (*Rosa gallica* and *Rosa centifolia*); elder flowers and bark (*Sambucus Canadensis*); European elder (*Sambucus nigra*); hardhack (*Spiræa tomentosa*); cramp bark (*Viburnum opulus*); black haw (*Viburnum prunifolium*); mountain laurel (*Kalmia latifolia*); common arbor vitæ (*Thuja occidentalis*); boxwood (*Buxus sempervirens*); rosemary (*Rosmarinus officinalis*); sweet bay (*Laurus nobilis*).

The following are some of the cultivated vines and climbers that yield drugs: American ivy or Virginia creeper (*Parthenocissus quinquefolia*); staff vine or false bittersweet (*Celastrus scandens*); Carolina jasmine (*Gelsemium sempervirens*); hops (*Humulus Lupulus*); yellow parilla or moonseed (*Menispermum Canadense*); passion-flower (*Passiflora incarnata*); bittersweet (*Solanum Dulcamara*).

The following are some of the hardy herbaceous perennials that are to be obtained: Yarrow (*Achillea millefolium*); sweet flag (*Acorus Calamus*); pasque flower (*Pulsatilla hirsutissima*); American senna (*Cassia Marylandica*); helonias or blazing star (*Chamælirium luteum*); lily-of-the-valley (*Convallaria majalis*); foxglove (*Digitalis purpurea*); echinacea (*Echinacea angustifolia*); water eryngo (*Eryngium aquaticum*); cranesbill (*Geranium maculatum*); blazing star (*Lacinaria spicata*); ground ivy (*Glecoma hederacea*); peony (*Pæonia officinalis*); abscess root (*Polemonium reptans*); thimbleweed (*Rudbeckia laciniata*); East Tennessee pink root (*Ruellia ciliosa*); rue (*Ruta graveolens*); sage (*Salvia officinalis*); rosin-weed or compass plant (*Silphium laciniatum*); garden thyme (*Thymus vulgaris*); blood root (*Sanguinaria Canadensis*); comfrey (*Symphytum officinale*); aconite (*Aconitum napellus*); chamomile (*Anthemis nobilis*); pleurisy root (*Asclepias tuberosa*); wild indigo (*Baptisia tinctoria*); black snakeroot (*Cimicifuga racemosa*); Indian physic or bowman's root (*Porteranthus trifoliatus*); liverwort (*Hepatica triloba*); lavender (*Lavandula vera*); peppermint (*Mentha piperita*); Solomon's seal (*Salomonia*

biflora); wood betony (*Betonica officinalis*); beth-root (*Trillium erectum*); star-grass, unicorn root or colic-root (*Aletris farinosa*); garlic (*Allium sativum*); hollyhock (*Althæa rosea*); anise (*Pimpinella anisum*); fennel (*Fœniculum vulgare*); bitter apple (*Citrullus colocynthis*); ginseng (*Panax quinquefolium*); white and red squill (*Urginea maritima* and its varieties).

Among the cacti may be mentioned: night-blooming cereus (*Cactus grandiflorus*); and mescale (*Lophophora lewinii*).

The following annuals are also cultivated: Hemp (*Cannabis sativa*); cayenne pepper (*Capsicum fastigiatum*); common or garden parsley (*Apium petroselinum*); caraway (*Carum Carui*); coriander (*Coriandrum sativum*); watermelon (*Citrullus vulgaris*); pumpkin (*Cucurbita pepo*); horseradish (*Roripa armoracia*); cotton (*Gossypium species*); lactucarium (*Lactuca virosa* and other species of *Lactuca*); garden marigold (*Calendula officinalis*); tobacco (*Nicotiana tabacum*); sweet basil (*Ociman basilicum*); sweet marjoram (*Origanum Majorana*); poppy (*Papaver somniferum*); summer savory (*Satwelia hortensis*); broom corn seed (*Sorghum vulgare var. technicum*); red clover (*Trifolium pratense*); white clover (*Trifolium repens*); corn silk (*Zea mays*); see also list of sweet, pot and medicinal herbs on page 569.

Among ferns the following may likewise be procured: male fern (*Dryopteris marginalis*); polypody leaves (*Polypodium vulgare*); maiden hair (*Adiantum hirsutum*).

The following orchids may be obtained through nurserymen: Small yellow lady's slipper (*Cypripedium parviflorum*); yellow lady's slipper (*Cypripedium pubescens*).

MEDICINAL PLANTS WHICH ARE CULTIVATED.

The following are some of the plants that have been grown successfully in this country, both on a small and a large scale: Mr. Henry N. Rittenhouse, Philadelphia, has grown licorice for years in an ordinary city yard. In this connection it is interesting to remember that a species of glycyrrhiza (*G. lepidota*) is quite common in certain parts of the West, from Minnesota to California, and it is not unlikely that *Glycyrrhiza glabra* would be easily naturalized.

Mr. C. B. Allaire has successfully raised colocynth in New Mexico from Trieste seed.

Spanish saffron has been grown successfully according to letters

which I received some years ago from Mr. J. L. Lemberger and the late Charles A. Heinitsh in both Lebanon County and Lancaster County in Pennsylvania.

According to Mr. A. M. Todd, peppermint has been successfully cultivated in Wayne County, N. Y., and Ohio, but at the present time the great crop from cultivated plants comes from Michigan, it being estimated that 40,000,000 pounds of peppermint are produced annually in Michigan within a radius of 75 miles of Kalamazoo.

Valerian has been grown in New Hampshire, Vermont and New York, and is still produced, I understand, in Vermont.

The plant yielding castor oil has been extensively cultivated in certain portions of the West and Middle States in this country.

Flax is extensively cultivated in the United States; the amount of seed annually produced is about 15,000,000 bushels.

The recent report by Mr. A. J. McClatchie on "The Eucalypts Cultivated in the United States," shows that a number of species are extensively cultivated in the Southwestern section.

The cultivation of ginseng has become an important industry within recent years in various parts of the United States Several hundred pounds of digitalis, conium, chamomile and a less quantity of nettle (*Urtica urens*) and belladonna, I am told, are annually collected from cultivated plants in the vicinity of Philadelphia.

Cannabis sativa, *Papaver somniferum*, *Cinnamomum Camphora* and other plants have been successfully cultivated in the United States. Many persons have no doubt succeeded as I have in growing the following medicinal plants: *Digitalis purpurea*, *Atropa Belladonna*, *Inula Helenium*, *Sanguinaria Canadensis*, *Caulophyllum thalictroides*, *Cimicifuga racemosa*, *Menispermum Canadense*, *Cornus Florida*, *Liquidambar styraciflua*, *Sambucus Canadensis*, *Tanacetum vulgare*, *Asarum Canadense*, *Aralia nudicaulis*, *Aspidium marginale*, *Euonymus Americana* and *Glecoma hederacea*.

All of the plants (about 190) enumerated in the preceding lists as being listed by nurserymen will probably give satisfactory results.

THE CONDITIONS FOR CULTIVATION.

In attempting to cultivate medicinal plants, as with other plants, it is important to study the requirements of individual species, and perhaps the safest plan would be to produce the conditions as nearly as possible as they obtain in nature, of course bearing in mind the

fact that in time most plants can adapt themselves to surroundings differing from those of their original habitat. It is true also that very many of our economical plants have been improved by cultivation, and there is no reason to believe that like results would not follow the cultivation of medicinal plants.

Still, notwithstanding this general law of adaptation, in order to be sure of results we must take into consideration the particular conditions under which a given species will thrive best to obtain the best results. For example, some plants appear to prefer a dry soil, as *Sassafras variifolia;* others, a damp location, as *Veratrum viride;* some prefer a rich soil, as *Asarum Canadense*, while others grow in waste places and on ballast, as *Matricaria chamomilla;* some prefer shade, as *Arisaema triphyllum*, and others exposure to direct sunlight, as *Datura stramonium*. Among the other factors which must also be taken into consideration is that of altitude, some plants appearing to thrive best high up on hills or mountains, as species of *Aconitum*, while others seek the lowlands and marshes, as *Acorus Calamus*. The question of latitude ought also to be considered owing to the extremes in our country in this particular.

Of course it is not practicable or even desirable in a paper of this kind to enumerate all of our native medicinal plants and to give the conditions under which each species will thrive best, but almost any work on systematic botany will give such data as would give a clue to the nature of any plant that might be selected for purposes of cultivation.

NATIVE MEDICINAL PLANTS.

The following medicinal plants, not mentioned in the preceding lists, grow in sufficient numbers in this country that it ought not to be difficult to secure them or their seeds for purposes of cultivation: balsam fir or balsam spruce (*Abies balsamea*); calamus (*Acorus Calamus*); European agrimony (*Agrimonia Eupatoria*); couch grass or dog grass (*Agropyrum repens*); tree of heaven (*Ailathus glandulosa*); common chickweed (*Alsine media*); marshmallow (*Althæa officinalis*); scarlet pimpernel (*Anagallis arvensis*); angelica seed (*Angelica atropurpurea*); mayweed (*Anthemis cotula*[2]); bitter root (*Apocynum*

[1] Plants parasitic.

[2] Some plants are such common weeds that they might probably be collected in certain localities.

androsaemifolium); Canadian hemp (*Apocynum cannabinum*); dwarf elder (*Aralia hispida*); American sarsaparilla (*Aralia nudicaulis*); Uva Ursi (*Arctostaphylos Uva-Ursi*); mescale (*Anhalonium Lewinii*); burdock (*Arctium Lappa*); manzanita (*Arctostaphylos glauca*); Indian turnip (*Arisæma triphyllum*); serpentaria (*Aristolochia Serpentaria*); southernwood (*Artemisia Abrotanum*); common wormwood (*Artemisia Absinthium*); wormwood, mountain sage, or Sierra salvia (*Artemisia frigida*); common mugwort (*Artemisia vulgaris*); Canada snake root (*Asarum Canadense*); white Indian hemp (*Asclepias incarnata*); silkweed (*Asclepias syriaca*); papaw seed (*Asimina triloba*); spice bush (*Benzoin Benzoin*); Oregon grape (*Berberis aquifolium*); black sampson or purple cone flower (*Echinacea angustifolia*, syn. *Brauneria purpurea*); borage (*Borago officinalis*); Indian hemp (*Cannabis sativa*); shepherd's purse (*Bursa Bursa-pastoris*[2]); blessed thistle (*Cnicus benedictus*[2]); pond-lily or sweet-scented white water-lily (*Castalia odorata*); blue cohosh (*Caulophyllum thalictroides*); red root or New Jersey tea (*Ceanothus Americanus*); true unicorn root, star grass (*Chamaelirium luteum*); celandine (*Chelidonium majus*); salt rheum weed, balmony, turtle head or snake head (*Chelone glabra*); American wormseed (*Chenopodium anthelminticum*[2]); pipsissewa (*Chimaphila umbellata*); common feverfew (*Chrysanthemum Parthenium*); Canada thistle (*Carduus arvensis*); black cohosh (*Cimicifuga racemosa*); stone root (*Collinsonia Canadensis*); sweet fern (*Comptonia peregrina*, syn. *Myrica asplenifolia*); gold thread (*Coptis trifolia*); coral root or crawley root (*Corallorhiza odontorhiza*[1]); round-leaved dogwood or green osier bark (*Cornus circinata*); red osier dogwood (*Cornus stolonifera*); American dittany (*Cunila origanoides*; broom tops (*Cytisus Scoparius*); stramonium leaf and seed (*Datura Stramonium*); turkey corn or squirrel corn (*Bicuculla Canadensis*); wild yam root (*Dioscorea villosa*); sundew (*Drosera rotundifolia*); male fern (*Dryopteris marginalis* and *D. Filix-mas*); bittersweet (*Solanum Dulcamara*); scouring rush (*Equisetum hyemale*); fireweed (*Erechtites hieracifolia*); fleabane (*Erigeron Canadense*[2]); yerba santa (*Eriodictyon Californicum*); European centaury (*Erythraea Centaurium*[3]); boneset

[3] Some foreign plants, while thoroughly established in certain parts of this country, might be more profitably obtained from dealers in foreign seeds and plants.

(*Eupatorium perfoliatum*); queen-of-the-meadow, joe-pye or trumpet-weed (*Eupatorium purpureum*); yerba reuma or flux herb (*Frankenia grandifolia*); European wood-strawberry leaves (*Fragaria vesca*); American columbo (*Frasera carolinensis*[3]); cleavers (*Galium aparine*); California fever-bush (*Garrya Fremontii*); wintergreen (*Gaultheria procumbens*); ague weed, stiff gentian, 5-flowered gentian (*Gentiana quinquefolia*); purple or water-avens (*Geum rivale*); sweet or white balsam, sweet or fragrant life everlasting (*Gnaphalium obtusifolium*); grindelia (*Grindelia robusta*[4] and *G. squarrosa*[4]); pennyroyal (*Hedeoma pulegioides*); frostwort (*Helianthemum Canadensis*); false unicorn root (*Helonias bullata*); masterwort, cow parsnip (*Heracleum lanatum*); hydrastis (*Hydrastis Canadensis*[3]); common St. John's wort (*Hypericum perforatum*); hyssop (*Hyssopus officinalis*); wild celandine, pale touch-me-not (*Impatiens aurea*); twin leaf (*Jeffersonia diphylla*); mountain or sheep laurel (*Kalmia latifolia*); mountain mint (*Koellia incana* and *K. virginiana*); lactucarium (*Lactuca virosa*); motherwort (*Leonurus cardiaca*); cancer root or beech drop (*Leptamnium Virginianum*[1]); Culver's root (*Leptandra Virginica*); lovage (*Levisticum officinale*); deer tongue, vanilla-plant, vanilla leaf (*Liatris odoratissima*, syn. *Trilisa odoratissima*); lobelia (*Lobelia inflata*); bitter bugle weed, water or marsh horehound (*Lycopus Europaeus*); purple bugleweed (*Lycopus Virginicus*); low, dwarf or running mallow (*Malva rotundifolia*); horehound (*Marrubium vulgare*); wild or German chamomile (*Matricaria chamomilla*); mandrake (*Podophyllum peltatum*); yellow sweet clover, yellow melilot (*Melilotus officinalis*); spearmint (*Mentha viridis*); buckbean, marsh or bean trefoil (*Menyanthes trifoliata*); yerba buena (*Micromeria Douglasii*); squaw-vine, partridge berry (*Mitchella repens*); horsemint leaves (*Monarda punctata*); sweet fern (*Comptonia peregrina*, syn. *Myrica asplenifolia*); catnip, catmint (*Nepeta Cataria*); large yellow pond lily (*Nymphæa advena*); common evening primrose (*Onagra biennis*, syn. *Oenothera biennis*);

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[3] Possibly the cheapest way to secure both American and foreign plants for purposes of cultivation would be to purchase the fresh or green drug, as of roots, rhizomes, etc., gathered at the resting period of the plant.

[4] The recently gathered drug will in some instances contain mature fruits and seeds that may be successfully grown as many of the compositæ, labitæ, solanaceæ, etc.

sourwood leaves (*Oxydendrum arboreum*); field, red or corn poppy flowers (*Papaver Rhoeas*); American ivy or Virginia creeper (*Parthenocissus quinquefolia*); ditch or Virginia stonecrop (*Penthorum sedoides*); American mistletoe (*Phoradendron flavescens*); poke root and berries (*Phytolacca decandra*); small burnet saxifrage, small pimpernel (*Pimpinella Saxifraga*[3]); common or greater plantain leaves (*Plantago major*); mandrake (*Podophyllum peltatum*); poison-ivy (*Rhus toxicodendron*); senega (*Polygala Senega*); American, dotted or water smartweed (*Polygonum punctatum*); bearsfoot (*Polymina Uvedalia*); hair cap moss (*Polytrichum juniperinum*); balm of gilead buds or balsam poplar buds (*Populus candicans*); Indian black-root (*Pterocaulon pychnostachyum*); dewberry, low running blackberry (*Rubus Canadensis*); wild red raspberry leaves (*Rubus strigosus*); high bush blackberry root (*Rubus nigrobaccus*); sheep sorrel (*Rumex acetosella*); yellow dock (*Rumex crispus*); saw palmetto (*Sabal serrulata*); red or American centaury (*Sabbatia angularis*); quinine flower (*Sabbatia Elliottii*); blood root (*Sanguinaria Canadensis*); soapwort (*Saponaria officinalis*); trumpet plant (*Sarracenia flava*); pitcher plant (*Sarracenia purpurea*); Maryland figwort, carpenter's square, heal-all or pilewort (*Scrophularia Marylandica*); mad-dog skullcap (*Scutellaria lateriflora*); uncum or life-root (*Senecio aureus*); prairie pine-weed, button snake-root, rosin weed, prairie dock (*Silphium terebinthaceum*); Jacob's ladder, carrion flower (*Smilax herbacea*); bamboo-brier root (*Smilax Pseudochina*); horsenettle (*Solanum carolinense*); sweet or anise-scented goldenrod (*Solidago odora*); European goldenrod (*Solidago Virgaurea*); pink-root (*Spigelia Marylandica*); marsh-rosemary (*Limonum Carolinanum*); queen's root (*Stillingia sylvatica*); pencil flower (*Stylosanthes biflora*); skunk cabbage (*Spathyema fœtida*); tansy (*Tanacetum vulgare*); dandelion (*Taraxacum officinale*); cancer root or beech drop (*Thelesia uniflora*[1]); vanilla leaf, deer-tongue (*Trilisa odoratissima*); hemlock (*Tsuga Canadensis*); coltsfoot (*Tussilago Farfara*); California laurel (*Umbellularia Californica*); stinging or great nettle (*Urtica dioica*); American hellebore (*Veratrum viride*); mullein (*Verbascum Thapsus*); blue vervain (*Verbena hastata*); common speedwell (*Veronica officinalis*).

FOREIGN MEDICINAL PLANTS.

Considering the number of plants which have been introduced into this country, and more or less successfully grown here, it must be admitted that the possibilities of the cultivation of a number of medicinal plants of foreign origin is exceedingly promising.

The following are some medicinal plants that might be profitably cultivated in this country, but plants and seeds can probably only be secured through special orders of dealers in foreign plants and seeds: Guaco root (*Agave planifolia*); pellitory (*Anacyclus Pyrethrum*); saf-flower or American saffron (*Carthamus tinctorius*); angelica root (*Angelica archangelica*); Roman chamomile (*Anthemis nobilis*); arnica (*Arnica Montana*); sabadilla (*Asagræa officinalis*); blood flower or bastard Ipecacuanha (*Asclepias Curassavica*); belladonna (*Atropa Belladonna*); wood betony (*Betonica officinalis*); borage (*Borago officinalis*[1]); bou-nefa or thapsia (*Thapsia Garganica*); manaca (*Brunfelsia hopeana*); bryony (*Bryonia alba*); canella (*Canella Winterana*); white sapote or zapote or istactzapotl (*Casimioroa edulis*); senna (*Cassia acutifolia* and *C. angustifolia*); lippia Mexicana (*Cedronella Mexicana*); colocynth (*Citrullus Colocynthis*); colchicum corm and seed (*Colchicum autumnale*); conium (*Conium maculatum*[1]); cascarilla (*Croton Eluteria*); larkspur seed (*Delphinium Consolida*); stavesacre seed (*Delphinium Staphisagria*); duboisia leaves (*Duboisia myoporoides*); eye-bright (*Euphrasia officinalis*); European wood-strawberry leaves (*Fragaria vesca*[1]); gentian (*Gentiana lutea*); licorice (*Glycyrrhiza glabra* and the *var. glandulifera*); black hellebore (*Helleborus niger*); henbane (*Hyoscyamus niger*[1]); maté or Paraguay tea (*Ilex paraguayensis*); elecampane (*Inula Helenium*[1]); Florentine orris root (*Iris Florentina*); laurel, sweet bay (*Laurus nobilis*); bitter bugleweed, water or marsh horehound (*Lycopus Europæus*[1]); wild or German chamomile (*Matricaria Chamomilla*[1]); water fennel seed, fine-leaved water-hemlock (*Oenanthe Phellandrium*); field, red or corn poppy flowers (*Papaver Rhœas*[1]); poppy (*Papaver somniferum*[1]); bistort (*Polygonum bistorta*); tormentilla root (*Potentilla Tormentilla*); lungwort (*Pulmonaria officinalis*); rhubarb (*Rheum officinale*); cevadilla (*Schoenocaulon officinale*); scopola (*Scopola Carniolica*); figroot or carpenter's square (*Scrophu-*

[1] Many of the plants in this list have become naturalized to a limited extent in this country.

laria nodosa); European goldenrod (*Solidago Virgaurea*); water germander (*Teucrium scordium*); thapsia (*Thapsia Garganica*); squill (*Urginea scilla*); valerian (*Valeriana officinalis*); pansy (*Viola tricolor*).

The following medicinal plants are either indigenous or in cultivation in various tropical and other portions of the world, and while they might be grown in this country, still they would probably require considerable study before one's efforts would be crowned with success: Jequirity (*Abrus precatorius*); catechu (*Acacia catechu*); galangal (*Alpinia officinarum*); fish-berries (*Anamirta paniculata*;) areca or betel nut (*Areca catechu*); quebracho (*Aspidosperma quebracho-blanco*); buchu (*Barosma betulina* and *B. crenulata*); manaca (*Brunfelsia hopeana*); pareira (*Chondrodendron tomentosum*); cinchona bark (*Cinchona species*); cinnamon bark (*Cinnamomum species*); cola (*Cola acuminata*); myrrh (*Commiphora Myrrha*); turmeric (*Curcuma longa*); angustura (*Cusparia angostura*); tonka bean (*Dipteryx odorata*); coto bark (*Drimys Winteri*); cardamom (*Elettaria repens*); embelia (*Embelia ribes*); coca (*Erythroxylon coca*); cloves (*Eugenia caryophyllata*); chequen (*Eugenia Chequen*); jambul seed (*Eugenia jambolana*); pichi (*Fabiana imbricata*); asafetida (*Ferula fœtida*); musk root (*Ferula Sumbul*); mangosteen fruit (*Garcinia Mangostana*); guaiac wood and resin (*Guaiacum officinale* and *G. sanctum*); cocillana bark (*Guarea Rusbyi*); chaulmugra oil (*Gynocardia odorata*); logwood (*Hematoxylon campechianum*); cusso (*Hagenia abyssinica*); ipecac (*Cephaelis ipecacuanha*); caroba leaves (*Jacandra procera*); jalapa (*Ipomœa jalapa*); Calumba (*Jateorhiza palmata*); rhatany (*Krameria triandra* and other species); muirapuama (*Liriosma ovata*); malabar nut (*Adhatoda vasica*); kamala (*Mallotus philippinensis*); condurango (*Marsdenia condurango*); nutmeg and mace (*Myristica fragrans*); guarana (*Paullinia cupana*); boldo (*Peumus Boldus*); calabar bean (*Physostigma venenosum*); quassia (*Picraena excelea*); jaborandi (*Pilocarpus Jaborandi* and other species); allspice (*Pimenta officinalis*); matico (*Piper angustifolium*); cubeb (*Piper Cubeba*; kava-kava (*Piper methysticum*); black pepper (*Piper nigrum*); Jamaica dogwood (*Piscidia erythrina*); tonga (*Premna taitensis*); kino (*Pterocarpus marsupium*); sandal wood (*Pterocarpus santalinus*); pomegranate bark (*Punica granatum*); soap-tree bark, Panama bark (*Quillaja Saponaria*); cedron seed (*Simaba cedron*);

simaruba bark (*Simaruba amara*); sarsaparilla (*Smilax medica* and other species of *Smilax*); strophanthus (*Strophanthus Kombe* and *S. hispidus*); ignatia (*Strychnos Ignatii*); Hoag-nan (*Strychnos malaccensis*); nux-vomica (*Strychnos Nux-vomica*); chirata (*Swertia Chirata*); tolu (*Toluifera Balsamum*); balsam of Peru (*Toluifera Pereiræ*); damiana (*Turnera diffusa*); gambir (*Uncaria Gambir*); ginger (*Zingiber officinale*).

From the several classifications of plants yielding drugs which are used to a greater or less extent at the present time, which I have made, including those (1) that are cultivated; (2) that grow wild in this country; (3) that might be cultivated or introduced into this country; and (4) plants that might not be readily cultivated, we have the following approximate but interesting figures:

[1] Cultivated medicinal plants in the U. S.	190
[2] Wild indigenous or naturalized medicinal plants	178
[3] Foreign medicinal plants that might be cultivated	56
[4] Foreign medicinal plants uncertain as to cultivation	75

These figures, while more or less approximate, show that about three-fourths of all the medicinal plants are growing either wild or in cultivation in this country; and that of the remaining one-fourth, probably one-half of these could be grown in this country, leaving but a comparatively small number of plants that might not yield immediate returns; but even of these it would not be surprising if there are a number of plants which might be introduced with more or less success, as the plants yielding Jalapa, Columbo, etc.

There are some plants the cultivation of which is probably altogether out of the question for the present, as: *Chondrus crispus*, *Fucus vesiculosis;* and *Quercus lusitanica*, producing Aleppo galls There are, however, several species of quercus of the south as *Q. coccinea* and *Q. imbricaria* which produce galls rich in tannin.

The cultivation of chondrus and fucus would probably mean a great outlay of money and considerable ingenuity in the development of methods. As to the propagation of ergot, ustilago, agaric, etc., it would probably be undesirable to have this done without special care and restrictions, as otherwise more damage would result than benefit.

EXPERIENCE IN SEED GERMINATION.

This brings me to say a word regarding the nurseryman's stock of plants and seeds. They may or may not be labeled correctly. In one of the principal botanical gardens of Europe I saw during the flowering period another species of cornus (*C. stolonifera*) which was labeled *Cornus florida*, evidently due to some accident while labeling. Several years ago I received a young plant which had been raised from seed—supposed to be of *Digitalis purpurea*. It did not flower in the second year, but the third year I set it out and it produced the characteristic inflorescence of the mammoth foxglove (*Digitalis monstrosa*) which has the large flower with separate petals at the apex of the large spikes. It is very apparent in the latter case how dangerous it is to take the seedman's word for the plant, particularly as the leaves would be collected from plants of the second year's growth prior to the flowering of the plant. Of course, if one allowed a number of plants to mature—as they naturally would do—for seed for succeeding years' work the mistake would be seen. But too much care cannot be exercised in the selection of seed. The best houses only should be patronized and fair prices should be willingly paid in order to secure seed true to name and of excellent quality.

Of the following plants seeds are easily obtainable: Aconite (*Aconitum napellus*); marigold (*Calendula officinalis*); foxglove (*Digitalis purpurea*); lavender (*Lavandula vera*); flaxseed (*Linum usitassimum*); passion flower (*Passiflora incarnata*); castor-oil plant (*Ricinus communis*); sunflower (*Helianthus annuus*); pumpkin (*Cucurbita Pepo*); watermelon (*Cucurbita Citrullus*); celery (*Apium graveolens*); and all of the annuals given on page 557.

In growing medicinal plants from seeds it will usually pay to germinate them under glass or in seed boxes and not attempt to propagate them in open soil. I was surprised a few years ago when I collected a large quantity of mature fruits of *Podophyllum peltatum* to find upon distributing them in my yard that not a plant came up. Many of us have had similar experiences with *Aconitum napetlus*, *Digitalis purpurea*, etc., when by germinating the seeds first in small boxes and then transplanting the young plants we would have been more successful.

In the growing of plants from seeds it is necessary to bear in mind that the germination period of the seeds of different plants and of

even the same plant varies greatly. My first experience in the growing of belladonna and inula was rather interesting in that I sowed the seeds in open ground one year and saw no evidence of the plants until the next year. I have reason to believe that conditions of this kind exist in nature not infrequently. Our trouble in growing certain plants like lobelia is probably due to our lack of knowledge concerning the entire life-history of the plant, as it is no doubt true that certain plants require a longer period of rest before resuming their vegetative activities than others. Mr. O. D. Graff, of Berry, Ill., first called my attention to the fact that lobelia appeared to be abundant in that locality only every other year, and stated that 1897 was an off-year for this plant. My own rather meagre observations would tend to confirm this view not only with regard to this but other plants. A prominent rose-grower has informed me that rose seeds of the same plant may require anywhere from three weeks to three years for germination.

THE COLLECTION, CURING AND YIELD OF DRUGS.

In a previous paper (this JOURNAL, 1902, page 311) I have called attention to the rules to be observed in the time of collection of vegetable drugs and to the importance of properly drying them and preparing them for the market. When not only the nature of the plant, but the diversity of constituents of vegetable drugs is taken into consideration, it will be admitted that the collection and preparation of them for the market is really a fine art, requiring a keen appreciation and extended knowledge of the subject, and is one which cannot be put by lightly as of little consequence. The large crude drug collectors give instruction to their employees as to the methods to be followed in the preparation of the drug; this knowledge having been acquired as the result of years of experience. We are apt to think that the only drugs that require particular care are those like tobacco, vanilla and gentian, where in addition to drying there is a curing process that takes place; but this is true also of digitalis, the solanaceous leaves and many of the important drugs. While the quality thus acquired, like that of teas and wines, etc., cannot readily be determined by any assay process, yet the therapeutist is able to appreciate the difference between the drug carefully collected and prepared from the one that is carelessly handled.

The cultivation of certain medicinal plants has made it possible

economically to produce uniform products, and to devote more attention to the curing of the drug, which is usually shown in the appreciation of the article by the physician as well as by the better price which it commands.

Mr. Wm. Krebs[1] has given some interesting data on the yield of the drug from the fresh material, and I have summarized some of his data without, however, confirming them myself.

The yield of dried drug is usually about 20 per cent. of the fresh material in such roots as Taraxacum, Phytolacca and Lappa; rhizomes, as Sanguinaria, Hydrastis, Asarum and Calamus; and herbs, as *Nepeta Cataria*, *Leonurus Cardica*, Hedeoma, Mentha piperita, Scutellaria, Tanacetum and Gaultheria. In other instances the yield of crude drug is only about 10 per cent. of the original weight, as of Eupatorium, Stramonii Folia and *Achillea millefolium*. In still other cases the loss is much less, as in Aspidium, Cimicifuga, Caulophyllum, Castanea, Hamamelis and Rumex, where the yield is about 30 per cent. In the case of hops the yield of drug is over 65 per cent.

CONCLUSION.

The American people are awakening to the necessity of the preservation of our native forests and of our wild flowers. We are beginning to realize that the care of our native plants is a trust, and are becoming aware that even our own safety and sustenance is dependent upon the intelligence which we exercise in the care of them. We are aroused to the fact that the products of nature are for us to legitimately use and conserve, and that we owe it to generations unborn to study them in their various relations to each other and their subservience to man's needs.

We are conserving plants and improving them by cultivation, and they serve us either for ornament, food or medicine. Probably the largest number of plants that are cultivated are those which are used for ornamental purposes. Many of these, as we have stated, also are valuable remedial agents and we see thus that the movements for the preservation of our forests and wild plants are of interest to the medical and pharmaceutical profession.

While the conservation and cultivation of medicinal plants in this

[1] Merck's Market Report, January 15, 1895, p. 22.

country may seem to be a new problem, yet in going over the lists of native plants that are cultivated for ornamentation, we find that probably more than half of them are of economical importance, and that about 200 are of medicinal value. The cultivation of medicinal plants having thus been carried on to a greater or less extent the experience gained will be of great value in their cultivation on a larger scale. Furthermore, the cultivation of medicinal plants is not a new question, as this industry has been practised on a small scale since the coming of the early colonists. Even in remote country places to-day nearly every farmer devotes a small plot of his garden to the cultivation of certain of the medicinal plants, such as anise, balm, sweet basil, bene, boneset, borage, caraway, castor-oil seeds, catnip, coriander, cumin, dill, sweet fennel, horehound, lavender, pennyroyal, peppermint, rosemary, rue, saffron, sage, summer and winter savory, sweet marjoram, tansy, tarragon, thyme and wormwood, all of these being listed in the nurserymen's catalogue at the present time. In this way many of the valuable European plants have in addition become distributed and naturalized in this country, as inula, hyoscyamus, symphytum, coltsfoot, stramonium, chelidonium, etc., so that we have a peculiar flora representing plants of the old and the new world. Considering the varieties of soil, latitude and altitude, it seems that the feasibilities of the cultivation of medicinal plants in his country are unlimited.

There are some who are impatient with the spirit of wastefulness and destructiveness in the American people. But it is important to remember that it has been natural for Americans to secure the largest prizes of our resources first. Many of the earlier workers as they bored the soil struck veins of ores and metals of untold riches, while others as they tapped the earth secured never-ending streams of fuel; and still others, as they scoured the fields and mountains, returned with plants of unprecedented virtues. As one region is exhausted new localities are discovered, and we have been inclined to believe with the great Huxley that man's efforts of replacement are futile compared to nature's own resources. But we are confronted with a fact, not a theory, and we believe that Americans will be as successful in the conservation of their forests and wild plants and animals as they have been original, fearless and fortunate in the discovery of her treasures and the development of her resources.

THE CENTENARY OF THE SOCIETY OF PHARMACY OF PARIS.

By M. I. Wilbert.

The centenary of the Society of Pharmacy of Paris, which occurred on October 17, 1903, was an event of more than passing interest. When we remember that this society is, and for a whole century has been, devoted exclusively to the advancement of original research, and the development of the various sciences relating to pharmacy, entirely apart from any interest in private educational enterprises, trade guilds or trade societies, we begin to appreciate how firmly pharmacy has established itself as a profession in that portion of the world.

It is true that there are few, very few, associations that are at all comparable to this society in age, scientific achievement or ideals, and what to us, as Americans, will perhaps appear as most unfortunate, is the fact that in the English-speaking world there is not a single pharmaceutical society that is at all comparable to it.

This latter rather lamentable fact is of course explained when we consider the history of the rise and development of pharmacy, or rather of apothecaries, in England and in France.

The origin and development of the apothecary in the two countries is very similar indeed, particularly in the two representative cities, which virtually constitute the centres of the respective countries.

In London, as in Paris, apothecaries first appeared as assistants to physicians, and were gradually emancipated and constituted into a guild or company with the grocers.

In both countries the apothecaries proved the more progressive and soon felt the inconvenience of being associated with a branch of trade with which they had little in common and from which they received little or no benefit.

In both countries the apothecaries, at an early date, founded a Garden of Simples, or Physic Garden, which was maintained and used for the purpose of instructing students, and for advancing their knowledge of medicinal plants.

In England the apothecaries were separated from the grocers as early as 1617 and given a separate charter, which carried with it certain rights and privileges. These charter rights were enlarged

on from time to time, until the English apothecary gradually developed into what the physician had been, a self-dispensing practitioner of medicine. This English apothecary in turn had considerable influence on the early development of medical practice in the United States. In Paris, on the other hand, the guild of the grocers and apothecaries existed until 1777. In that year, by a royal decree, the apothecaries were finally and completely separated from their unwelcome congeners, the grocers, and were not alone awarded their Physic Garden but were also given certain duties and privileges.

They were empowered to give public instruction in chemistry, botany and materia medica, to examine candidates, grant diplomas and also entertain a certain supervision over trade interests.

The Corporation of the Apothecaries, or as it was better known, the College of Pharmacy, may therefore be said to have had a threefold aspect; it was, at the same time, a teaching body, a scientific society, and a trade guild.

At an earlier date, it appears, there had been considerable friction between the apothecaries and the faculty of medicine, the latter denying the apothecaries the right to teach their own profession in public lectures or by demonstrations in their Physic Garden.

This periodic dispute was also finally and definitely settled by the decree of 1777, while a Royal ordinance dated February 10, 1780, placed the College of Pharmacy under Royal patronage and empowered the corporation to instruct and examine in the arts and mysteries of the apothecary and to grant to the successful applicants the degree of Master of Pharmacy.

In the years immediately succeeding its inauguration, the College of Pharmacy was enabled to materially enlarge on its vested privileges, so that the opening year of the French Revolution found the institution firmly established and generally recognized as a valuable and useful part of the body politic.

With other similar corporations the College of Pharmacy was abolished by the decree of March 2, 1791, the same decree leaving all persons free to exercise any trade, business or profession they chose, providing they obtained the necessary license.

The abuse of this privilege, in connection with the business of the apothecary, was so great that only six weeks later, on April 14th of the same year, the National Assembly made a temporary and

special exception in favor of the College of Pharmacy, thus practically restoring to it the privileges it held before the abolition of corporate bodies.

The history of the College during the next succeeding years is rather uncertain, little or no authentic data being available. It is probable that during the reign of terror, 1793, when all learned societies and academies were abolished and their property confiscated, that the College of Pharmacy was also included; there is no record of such abolition however, and in 1794, when the proposed Health School was being debated in the National Assembly, the College of Pharmacy is mentioned as being in existence and being all sufficient for the education of prospective pharmacists. Conditions appear to have been considered somewhat critical, however, for in 1796 the members of the College took advantage of an article in the fundamental law of the Republic to establish themselves into a Free Society of Pharmacy.

The law that made this change appear desirable had been enacted on September 23, 1795, and the particular article referred to gave citizens the right of forming establishments of education, and institutions and free societies for the progress of science, literature and the arts.

It was on March 20, 1796, that the College of Pharmacy, as such, went out of existence, by the action of its own members, and was nominally replaced by the Free School of Pharmacy, although in fact very little or no change took place.

This new institution was recognized by the Directory in the following year, 1797, and in this same year the first number of *The Journal of the Society of Pharmacy* was printed. This journal was edited by M. Fourcroy, with Demachy and Bouillon-Lagrange as sub-editors. After two years of independent existence, the journal was amalgamated with the *Annales de Chimie* to form the still existing organ of the society, the *Journal de Pharmacie et de Chimie.*

While the society had been able to withstand, without any appreciable change, the storm and stress period of the French Revolution, it fell a victim to the love for organization, or rather reorganization, developed by Napoleon on his accession as Emperor.

By an imperial decree, in 1803, a new State institution for pharmaceutical instruction was created, the chief or superior school of which was to be located in Paris. For the accommodation of this

school, the buildings and property of the Free School of Pharmacy were appropriated, thus virtually discontinuing the society by depriving it of its property, as well as its duties, privileges and prerogatives. This Imperial school has long since become world-famous as the "Ecole Supérieure de Pharmacie de Paris" (The Superior School of Pharmacy of Paris). It has been the model for almost every school or college of pharmacy in the world, and has always been looked up to and admitted to be in fact as in name, the first or leading school of pharmacy.

The Free Society of Pharmacy, however, was not composed of members who were readily disconcerted or disheartened. In place of doing in fact what had been done to them in name, ending their existence as an association or society and passing into history, the members promptly met and decided that inasmuch as they had been deprived of their duties as teachers and as supervisors of the trade interests of their occupation, they would, as an association, have more time to devote to the study of scientific problems connected with their profession.

It is as a purely scientific society, therefore, that this association of Parisian pharmacists has just celebrated its centenary, and it is with pardonable pride that M. Bourquelot, the able and efficient secretary of the society, in the course of his historical sketch, recalled the names of some of the earlier members and recounted their scientific achievements. What a galaxy of nobles they must have been, headed by Parmentier, the chief apothecary of Napoleon's army, who well advanced in years, it is true, was still active. He had accompanied the French army, under various leaders, into half the countries of Europe, and had always, by close observation, been able to gather new facts, which he in turn communicated to his confreres at home.

The Vice-President, M. Vauquelin, a pharmacist and world-renowned chemist, was one of the first to suggest the presence of active principles in medicinal plants, and was the undoubted discoverer of nicotine in tobacco.

M. Derosne, who was also one of the founders, was one of the first to make a chemical study of opium, separated narcotine and probably morphine.

The list is too long to give in detail. In it appear, among others, the names of Caventou, Pelletier, Magendie and Robiquet, all names

that represent giant strides in the development of pharmaceutical chemistry, and all names that should be familiar to all students in pharmacy.

But it was not alone by the work of its own members that this society has tried to advance the sciences more or less closely related to pharmacy. It has also, annually, offered prizes for the most satisfactory solution of scientific problems. The intelligent initiative given by these proposed questions, not only directed research into timely and promising channels, but also, in a number of cases, proved a distinct help and an impetus to struggling young scientists, who, without this timely recognition, might have directed their energies into less purely scientific channels. Among others, it is stated that the celebrated Pasteur, as a young man, was encouraged by being awarded one of the society's prizes.

All honor then to the Society of Pharmacy of Paris, and its illustrious members, past and present; together they richly deserve the felicitations and good-will of pharmacists in all parts of the world. May the society continue to be the ideal for a number of similar organizations to come, and may its members, present and prospective, continue to work and delve, as did the founders and their successors, unselfishly but steadily, for the benefit of generations yet unborn.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING ADVANCES IN PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia, Pa.

With the close of the calendar year it may be permissible to take a retrospect of the progress that has been made toward solving some of the problems more or less closely related to the practical sciences involved in pharmacy.

In the number of scientific meetings and congresses, the closing year has not been lacking. In addition to the usual local and national meetings of well-known pharmaceutical and scientific associations, there were held, during the past year, at least two international congresses at which matters relating to pharmacy were discussed. The first of these, the fifth International Congress for

Applied Chemistry, has already been noticed in this journal (A.J.P., 1903). The second, the International Medical Congress in Madrid, appears to have been typical of so-called international congresses. The attendance was so large that it was unwieldy, and this, with the lack of necessary organization, rather detracted from the scientific character of the proceedings.

If we review the reports of almost any of the proceedings of association meetings, we will be impressed with the fact that the programs that had been arranged for the several meetings were usually over-crowded, and that many of the contributed articles were necessarily read only by title. This fact is well illustrated by the proceedings of our own American Pharmaceutical Association, where it was found necessary to read upward of 40 per cent. of the contributed papers by title.

To obviate this evident injustice to the members attending the general meetings, and to make the several gatherings more interesting as well as more profitable to such as are willing or able to attend, is a problem that has been freely discussed from time to time.

In this connection the rather *novel plan of holding general meetings* adopted by the Faraday Society of England, may be of interest. The council of this society has determined that "All papers presented to the society will be printed and circulated among the members before being read, and, as a rule, they will be read in abstract only. Members and others unable to be present will be asked to send their contributions to the discussion in writing and their remarks will be read to the meeting."

It is self-evident that a plan of this kind could be developed that would save valuable time in the deliberations of societies and associations.

The printing of all papers in advance of the meeting would give the members an opportunity of carefully studying such as they were particularly interested in, while the reading of abstracts of papers only, would allow of more time for discussion.

RADIO-ACTIVE SUBSTANCES are probably among the subjects that have been foremost in the minds of physicists during the past year. The contributed articles that have been published bearing on this subject are ample evidence of the interest that is being displayed, while the number of able scientists who have been, and are, at work on the involved problems is suggestive of the scientific possibilities involved in the investigations.

Probably the most comprehensive and complete contribution on the subject that has been published up to this time is the series of articles now appearing in the current numbers of the *Chemical News*, constituting a "Thesis on Radio-active Substances Presented to the Faculté des Sciences de Paris," by Madame Sklodowska Curie.

In this thesis Madame Curie reviews the whole subject of radio-active matter, and records in detail the work done by herself and her husband on polonium and radium.

In discussing radium, Madame Curie gives the following characteristics: "The salts of radium, chloride, nitrate and sulphate resemble those of barium when freshly prepared, but they gradually become colored. All radium salts are luminous in the dark.

"In their chemical properties the salts of radium are absolutely analogous to the corresponding salts of barium. However, radium chloride is less soluble than barium chloride; the solubility of the nitrates in water is approximately the same.

"The salts of radium are the source of a spontaneous and continuous evolution of heat."

THE RADIATIONS FROM RADIO-ACTIVE BODIES are of a complex nature. Rutherford designates them as α, β and γ rays.

I. The α-rays are very slightly penetrating and appear to constitute the principal part of the radiations.

These rays are readily absorbed. They are slightly deflected in a strong magnetic field.

II. The β-rays are less absorbable than the α-rays. They are deflected by a magnetic field, in the same way as cathode rays.

III. The γ-rays are penetrating rays, unaffected by the magnetic field and comparable to the Röntgen rays.

One of the most interesting announcements in connection with radium was that recently made by Sir William Ramsay, who asserted that the radium emanations appear to consist of, or to produce, helium, one of the recently discovered inactive gases.

FOOD PRESERVATIVES have also continued to attract considerable attention during the past year. This is particularly true of European countries, where laws prohibiting the use of a number of these substances have been enacted. In our own country the Department of Agriculture has instituted an extensive series of experiments to determine the toxicity of the several chemical substances usually used as food preservatives.

Although the experiments are still being carried on, Dr. Wiley, under whose personal supervision the observations are being made, recently expressed the opinion that, whether these food preservatives are dangerous or not, in the quantities usually used, all food products containing them should be clearly and distinctly labelled as to the kind and quantity of chemical substances that have been added to preserve them.

ENZYME FERMENTATION.—Buchner's interesting and valuable discovery of the true cause of fermentation is being exploited in a practical way in Germany, where large quantities of yeast are to be found as by-products in the various industries where fermentation is a factor. The products, as made at the present time, are intended either as a substitute for meat extracts, or as antiseptics in medicine. A typical product of the latter class is *Zymin*. This is a sterilized yeast made by introducing the washed and partially dried yeast into acetone, subsequently drying at a low temperature, to prevent the coagulation of the contained albumins. The resulting product is a perfectly sterile, dry white powder, that retains the fermenting property of yeast for a considerable length of time.

A somewhat similar preparation is being made in France, by drying the washed yeast at low temperatures. This latter preparation is said to contain appreciable quantities of living yeast cells, which for medicinal use are not desirable. (R. Rapp, *Phar. Centralh.*, 1903, p. 224.)

Of the extracts of yeast, consisting chiefly of vegetable albumins, the following are typical preparations:

OVOS.—For this preparation, beer yeast is carefully washed, to free it from the bitter of hops; the yeast is then pressed and subjected to a steam-bath, which ruptures the membranous cell walls and allows the contained liquid to escape. The liberated cell contents are subsequently separated from the cell walls by pressure and filtration. The resulting liquid is evaporated to the consistency of a thick extract. This product is soluble in cold water, the aqueous solution has an acid reaction and responds to the usual tests for albumin.

SIRIS, Yeast Extract, is prepared by an ingenious process suggested by Buchner: The purified and pressed yeast is put into glass vessels and these are attached to an air-pump; a partial vacuum is then produced, and the yeast allowed to stand for twenty-four hours

At the end of this time the normal air pressure is restored, by the introduction into the glass receptacles of sufficient ether vapor. After standing twenty-four hours longer it is found that the yeast has been largely converted into a thick liquid; this is separated by filtration and is subsequently concentrated to a thick extract in a vacuum apparatus.

WUK.—This is prepared by introducing purified and washed yeast into an equal volume of water at from 60 to 70° C. The degree of temperature is important; it must be low enough to prevent the coagulation of the contained albumin and high enough to cause the yeast cells to burst and allow the escape of the contained liquid. The resulting liquid, after being filtered, is concentrated in vacuum apparatus. (*Phar. Centralh.*, 1903.)

Of the meetings and congresses not previously noticed in the pages of this journal, the "*Versammlung der Deutschen Naturforscher und Aerzte*," held in Kassel from the 21st to the 25th of September, deserves more than passing notice.

The meeting this year was somewhat in the nature of a jubilee meeting. All of the section meetings were well attended, a total of more than two thousand members and visitors being present. Among the subjects that were brought before the section of Pharmacy and Pharmacognosy were: *Studies in the Menthol Series*, by E. Beckmann, Leipzig, who, in an exhaustive paper, reviewed the chemistry of menthol, its derivatives and its isomers.

ON THE CONSTITUENTS OF KAVA-KAVA ROOT, P. Siedler, Berlin, whose investigations appear to corroborate the claims made by Lewin, Lavialle and others; Siedler believes that the medicinally active ingredient of kava-kava is the resin.

THE CONSTITUTION OF MYRISTICIN AND ITS OCCURRENCE IN FRENCH OIL OF PARSLEY.—H. Thoms, Berlin, has found that myristicin, a phenol ether, first isolated by Semmler in 1890, from oil of mace, replaces to a very large degree the apiol, in oil of parsley of French origin.

THE QUANTITATIVE ESTIMATION OF FREE PHOSPHORUS.—J. Katz, Leipzig, describes and recommends a modification of Straub's oxydation method of separating phosphorus as phosphoric acid.

At the second and final general session, Professor Behring, Marburg, read a communication on the "Prophylaxis of Tuberculosis" that has created considerable thought and comment. In this com-

munication Behring controverts the opinion expressed by Dr. Robert Koch, that there is an essential difference between bovine and human tuberculosis, and suggests the possibility of combating the tubercular tendency in children by feeding them with milk from cattle that have been immunized to tuberculosis. Behring expressed himself as being satisfied with the immunization that had been secured in the case of bovine animals, and while he admits the possibility of the future development of a similar immunization to the human family, he does not see any prospect of this being accomplished in the near future.

THE CENTENARY OF THE PARIS PHARMACEUTICAL SOCIETY was celebrated with due solemnity on October 17, 1903. This society is probably the oldest purely pharmaceutical association in existence at the present time. It is certainly to be classed among the most influential and most respected.

This society, inaugurated in 1803, is rather unique in that it is limited to a resident membership of sixty active members. There are in addition, twenty free associates, resident in Paris, but not necessarily practicing pharmacists. Then there are 100 national and eighty foreign correspondents who may or may not be pharmacists. Then there are honorary members and these are not necessarily limited in number.

The history of the society is an interesting one, the present society being directly descended from the College of Pharmacy which originated in the eighteenth century.

MARTINDALE MEMORIAL.—The Pharmaceutical Society of Great Britain has perfected a memorial of the late William Martindale. At the opening session of the School of Pharmacy, Mr. Carteighe, as treasurer of the Martindale Memorial Fund, gave an outline of the origin and object of the memorial.

The memorial itself consists of a marble bust of Mr. Martindale to be placed in the examination hall, and a silver medal to be annually awarded to the best student in pharmacy. (*Chem. and Drug.*, October 3, page 593.)

RICE MEMORIAL.—The published picture of the design for the Rice Memorial tablet that was recently unveiled in the hall of the College of Pharmacy of the City of New York, unfortunately contains an error in date that may at some future time lead to controversy.

The mistake is probably due to an inadvertent duplication of dates on the part of the designer. The date under "Editor of the U. S. Pharmacopœia" should have been 1880–1901, Dr. Charles Rice not being a member of the Pharmacopœial Revision Committee in 1870.

PHARMACOPŒIAS.—The supplement to the Dutch Pharmacopœia and the new edition of the Italian Pharmacopœia have been thoroughly discussed in recent numbers of the German pharmaceutical journals. A few of the details may be interesting.

OINTMENTS.—The new *Italian Pharmacopœia* divides ointments, rather arbitrarily into pomades and ointments. As a base, benzoinated lard, vaseline and lanolin are directed to be used; many of the formula in which benzoinated lard is given as the base also allow the use of vaseline or lanolin. Ointment of yellow oxide of mercury and the ointment of oxide of zinc are to be made with vaseline only.

In the matter of tinctures it is to be regretted that the recommendations of the international conference were not more closely followed. The tinctures are directed to be made by maceration, and not more than half of the tinctures of potent remedies are of the strength directed by the Brussels conference, 10 per cent.

Powders in the Italian Pharmacopœia are directed to be very fine, fine or coarse. The very fine powders must pass through a sieve having 1,600 meshes to a square centimeter of surface, for fine powders the sieve must have 900 meshes, and for coarse powders 100 meshes to a square centimeter.

ALCOHOLATURAE is the name applied in the Supplement to the Dutch Pharmacopœia to tinctures of fresh herbs.

These preparations are directed to be made by cutting and contusing the plant, or part of the plant, and macerating for seven days with an equal weight of alcohol. The fluid is then expressed and filtered.

INCENSE.—The *Chemist and Druggist* (London) has devoted considerable space in some of its recent numbers to a discussion of formulas for the incense used in Roman Catholic and other ritualistic churches. Among the formulas that have been suggested are the following:

(1) Gum olibanum, 20; gum benzoin, 6; cort. cascarilla, 5; cassia bark, 2; cloves (arom.), 2. Contuse and make into a coarse powder.

(2) Gum olibanum, 16; gum benzoin, 1·5; cascarilla bark, 1; styrax, 0·5. Mix.

(3) Olibanum, 14; benzoin, 4; tincture of cascarilla, 20. Mix, dry, and make into a coarse powder.

(4) Olibanum, 12; benzoin, 3; liquid styrax, 3; oil of lavender, 3. Mix.

HETRALIN.—This is dioxybenzol hexamethylene tetramine and occurs in white needle-shaped crystals, soluble in 4 parts of hot and 14 of cold water; it is not readily decomposed at ordinary temperatures. Hetralin is to be given in daily doses of from 1 to 1·5 grammes.

IPECACUANHIC ACID.—Kimmura (*Apothek. Zeit.*, 1903, page 451) finds this to be a glucoside acid, having the formula $C_{17}H_{26}O_{10}$. Ipecacuanhic acid has little or no effect in dysentery, and can therefore not be considered to be the active principle of de-emetized ipecacuanha.

THE KARAKA FRUIT of the Maoris, obtained from Corynocarpus Laevigata, has been examined by Easterfield and Aston, who found about 15 per cent. of a fixed oil, and in the aqueous extract, mannite, mannose and dextrose. On distillation this extract furnishes a considerable quantity of hydrocyanic acid. From it Skey was able to isolate a glucoside which has been called karakin. This is a crystalline body of the formula $C_{15}H_{24}O_{15}N_3$, which melts at 122° C. A second glucoside corynocarpin, in fine needle-like crystals, melting at 140° C., has also been extracted.

NARKOTILE, noted in a previous number of this JOURNAL (A. J. P., 1903, page 415), is a mixture of chloride of ethyl and chloride of methyl obtained by the action of hydrochloric acid on a mixture of ethyl and methyl alcohol. It is a clear stable liquid not decomposed by light, colorless and very volatile. It is highly inflammable and should never be used near an open light or fire. (*Apothek. Zeitung*, 1903, page 402.)

PALM OIL AND PALM KERNEL OIL.—Under this heading G. Fendler (*Ber. d. Deut. Phar. Gesell.*, 1903, page 115) gives an account of the origin, physical properties and uses of these oils.

The fruit of the palm tree occurs in grape-like bunches weighing from 20 to 30 kilos, the individual fruits weighing from 3·5 to 10 grammes. The fleshy portion of the fruit, consisting of from 24 to 70 per cent. by weight, furnishes the palm oil, and the kernel, 9 to

25 per cent. of the fruit by weight, when freed from the shell, the palm kernel oil.

The physical properties of the oils differ materially. Palm oil, at ordinary temperatures, has the consistency of butter and is used extensively in the manufacture of candles and soap. Palm kernel oil is white and resembles cocoanut oil.

The average constants are as follows:

	Palm Oil.	Palm Kernel Oil.
Melting point	40	28·9
Congealing point	36	23·5
Saponification number	203·0	248·6
Acid number	194·5	13·9
Per cent. of free acid, estimated as oleic acid	55·4	3·67

PUMPKIN SEED OIL.—The oil content of pumpkin seed was found by Strauss (*Chem. Zeitg.*, 1903, page 537) to be materially higher than that given by Graham, from 20 to 25 per cent. Strauss was able to obtain from 37 to 47 per cent. of a fixed oil, having an iodine number of from 116·5 to 120·5.

The oil has a deep reddish-green color that is quite indifferent to the ordinary bleaching materials like sulphuric or sulphurous acids, chlorine or ozone. It can be bleached by repeated saponification, but the resulting loss in oil is of course very great.

QUINAPHENIN, a white, tasteless powder, freely soluble in water, very soluble in alcohol, ether, benzene, chloroform and acids, is said to be obtained by the action of quinine on the hydrochlorate of etoxy phenyl carbamic acid or on etoxyphenylisocyanic ether. Quinaphenin has been recommended in whooping cough in doses of from 0·05 to 0·30 grammes. (*Amer. Med.*, Oct. 17, 1903, page 646, from *La Médicine Moderne.*)

STYPTOL.—Rudolph Katz (*Ther. Monatsh.*, 1903, page 314) describes styptol as a neutral conarnine pthalate, which occurs as a yellow micro-crystalline powder, freely soluble in water. Styptol contains about the same per cent. of the cotarnine base as the hydrochlorate of stypticin.

Styptol has been used in doses of from 0·05 to 0·10 in hemorrhage from the womb, with reported good results.

TRIQUORS.—This name has been applied in Germany to triple strength liquors. (*Phar. Centralh.*, 1903, page 772.)

PATENT LAWS.—A correspondent of the *Chemical News* (1903,

Vol. 88, page 147) calls attention to rather an innovation in existing patent laws, embodied in the proposed "Australian Federal Patents Bill," now pending for adoption by the Commonwealth of Australia. The provisions that are particularly interesting to American pharmacists, as a possible line of argument for use in connection with the proposed change in our own patent laws relating to product and process patents, are contained in section 83 of the proposed Australian law.

Every patent shall be granted subject to the following conditions: (*a*) That the patentee or some person authorized by him shall within five years after the date thereof commence, and after such commencement continuously carry on in Australia, the construction, manufacture or working of the invention patented in such a manner that any person desiring to use it may obtain it or the use of it at a reasonable price; and

(*b*) That the patentee shall not after four years from the date of the patent import the invention or cause it to be imported into Australia.

The same correspondent calls attention to an amendment of the Canadian patent laws, under the act of August 13, 1903, which provides "that the patentee or his representative must within two years commence and continuously carry on in Canada the construction or manufacture of his invention. If, after a period of twelve months from the grant of the patent, the patentee or his representative imports into Canada the invention for which the patent is granted, the patent shall be void."

PHARMACEUTICAL MEETING.

The stated Pharmaceutical Meeting of the Philadelphia College of Pharmacy was held on Tuesday afternoon, November 17th, with Mr. Howard B. French, President of the College, in the chair.

Upon calling the meeting to order the chairman announced that, in addition to the regular program, there would be the presentation of a portrait of the late Registrar of the College, W. Nelson Stem. Prof. Joseph P. Remington, who formally presented the portrait on behalf of the Memorial Committee, said that shortly after Mr. Stem's death a movement was started to present to the college a substantial memorial of him, and that it had been finally decided

to present a crayon portrait. Professor Remington said that Mr. J. M. Baer had acted as treasurer of the committee and that to him the many friends of Mr. Stem had sent their contributions. The portrait was made by Mr. Phillippi, from a group photograph of the members of the Faculty, by Gilbert and Bacon, Mr. Stem having been invited to sit with them.

Prof. Clement B. Lowe received the portrait for the college and spoke of his first acquaintance with Mr. Stem and of his regard and esteem for him. Mr. French said also that it gave him much satisfaction to have this portrait presented.

M. I. Wilbert, Ph.M., read a paper on "The Centenary of the Society of Pharmacy of Paris" (see page 570); and also gave a résumé of "The Later Developments in the Study of Radio-Active Matter" (see page 575), which was illustrated by means of lantern slides, among these being a section photograph of the instrument devised by Madame Curie for measuring the intensity of the rays emitted by radio-active substances. Formerly photographic plates were used for this work, but this method was unsatisfactory on account of the amount of time required, and was only approximate at best, besides being attended by a certain amount of expense.

In reply to a query by Mr. Frederick L. Lewton, of the Philadelphia Commercial Museums, Mr. Wilbert stated that the mineral uraninite from Colorado had been sent to M. and Mdme. Curie for examination and that it had been found to be richer in radio-active substance than pitchblende.

Dr. Rodney H. True, Physiologist in the Bureau of Plant Industry, *U. S. Department of Agriculture*, gave an address on the "Cultivation of Medicinal Plants," illustrating the same with drug specimens obtained from plants grown by the Department of Agriculture. Dr. True said that the Bureau had selected for the present three localities in which to carry on experiments in medicinal plant cultivation, these being in the Potomac flats at Washington, D. C., at Burlington, Vt., and in Texas; it being thought that these three plots would furnish a variety of climatic and soil conditions. He said that a strong motive for taking up this work arose from the fact that there is a shortage in the supply of a number of our native drugs due to the rapid collection of them. Some of the plants which were formerly very abundant are now very scarce. He said that Hydrastis Canadensis was formerly abundant in the Ohio valley

and eastward, but that now the drug is one of the rarest and that the plant is threatened with extermination.

Polygala senega was mentioned as another example of this kind, and it was stated that Cascara sagrada which was formerly abundant in Northern California and Oregon is becoming less abundant, and a shortage in the supply is threatened. With this condition in view the Bureau of Plant Industry has recently procured a small quantity of seeds of Cascara sagrada which are to be germinated and the seedlings distributed in the West and some in the East, also.

The Bureau has also a small patch of hydrastis under cultivation and it is hoped ere long to give out some information in regard to this drug which will be useful to cultivators. Experiments on the cultivation of Polygala senega are being carried on at the Burlington station, where pollination and seed production are being studied.

Dr. True said that the United States Treasury Reports at Washington furnish some rather interesting data. It is there recorded that the United States imports $15,000,000 worth of crude drugs annually and $1,800,000 worth of other products, including plant principles. He further stated that about one-half of those plants and plant products which are different from any of our own could be produced here. Among the reasons advanced for our not cultivating these plants here were: natural inertia, ignorance of the subject, especially on the part of agricultural communities, a doubt as to whether such industries would pay financially, the price of labor, and the high price of land near the large cities or centers of market. These are questions which are comparatively new and a certain amount of unprofitable experimenting will have to be done in order to work out methods which will yield profitable returns. The United States Department of Agriculture has taken up this line of investigation with the object of putting the question on a practical basis, and a careful account of the cost involved in the experiments is being kept.

In conclusion, Dr. True stated that the Bureau of Plant Industry is now working with about twenty-five medicinal plants, and a report on these will be published in the forthcoming year-book of the United States Department of Agriculture.

In discussing the address, Prof. Clement B. Lowe referred to the fact that during the Civil War opium was produced in New England, but that the gross adulteration of the product led to its disuse.

Prof. Joseph P. Remington stated that he had seven or eight specimens of opium in his collection from as many different States, and said that there did not seem to be so much difficulty in growing the poppy plant as in collecting the opium.

In answer to a question by Professor Lowe, Dr. True stated that some of the leaves collected from digitalis plants on the Pacific Coast, where they are regarded as weeds, had been assayed and found to be as good as any of the imported leaves.

Professor Remington said he had understood that the leaves from cultivated belladonna and hyoscyamus plants were not as rich in active principles as those obtained from wild plants.

In discussing the question of the relative amount of active principles in cultivated and wild plants, Prof. Henry Kraemer cited an instance to show that a plant that was grown for *Digitalis purpurea* was an entirely different species, and said that necessarily we would not expect beneficial results from such a spurious drug in the hands of the therapeutist. He also cited an instance to show that the chemical assay of digitalis, as usually carried out, is not an indication of the value of the drug.

In this connection Professor Kraemer exhibited a living digitalis plant which was three years old, and which bloomed the past summer. He said that the young plant had been given him by a student of his, who had obtained it from a cultivator who claimed that it was *Digitalis purpurea*, and who produces as much as 250 pounds of the drug a year for the market. Professor Kraemer said that when the plant bloomed, however, it proved to be *Digitalis monstrosa*, and that this circumstance showed how careful cultivators of medicinal plants should be in order to produce drugs of genuine botanical origin. He then spoke of the scarcity of genuine spigelia, and of the fact that for years a spurious root has been supplied to the market in its place, and said that no doubt much of the alleged inferiority of vegetable drugs was due to causes like the foregoing. In view of these and other observations, he advised the making of preliminary experiments in the growing of medicinal plants so as to establish the genuineness of the species, and also advised buying the best seeds from the most reliable houses. He enumerated a number of plants which he had under cultivation, and stated that he had seeds of both belladonna and inula which he would be glad to give to any one desiring them.

On motion of Mr. E. McC. Boring, a vote of thanks was tendered Dr. True for his interesting and instructive address.

George B. Weidemann, P.D., son of Dr. Chas. A. Weidemann, demonstrated a method of making tablets on a small scale, using a hand machine. He said that he uses a Stokes machine, which has the advantage of making one revolution for each tablet. He also remarked that, not considering the question of time, it is more economical for the pharmacist to make this class of preparations than to buy them of the wholesale manufacturer.

The following provisional program has been arranged for the next meeting, on December 15th:

Prof. John Uri Lloyd—An address on the Eclectic Resinoids and their Terminology.

Prof. Albert Schneider—Medicinal Plants in Botanic Gardens.

Gustavus Pile—The Manufacture of Thermometers.

FLORENCE YAPLE,
Secretary pro tem.

OBITUARY.

WILLIAM M. WARREN.

William M. Warren, general manager of Parke, Davis & Co., died at his home, 154 Lafayette Avenue, Detroit, Mich., on November 11th, of cerebro-spinal meningitis.

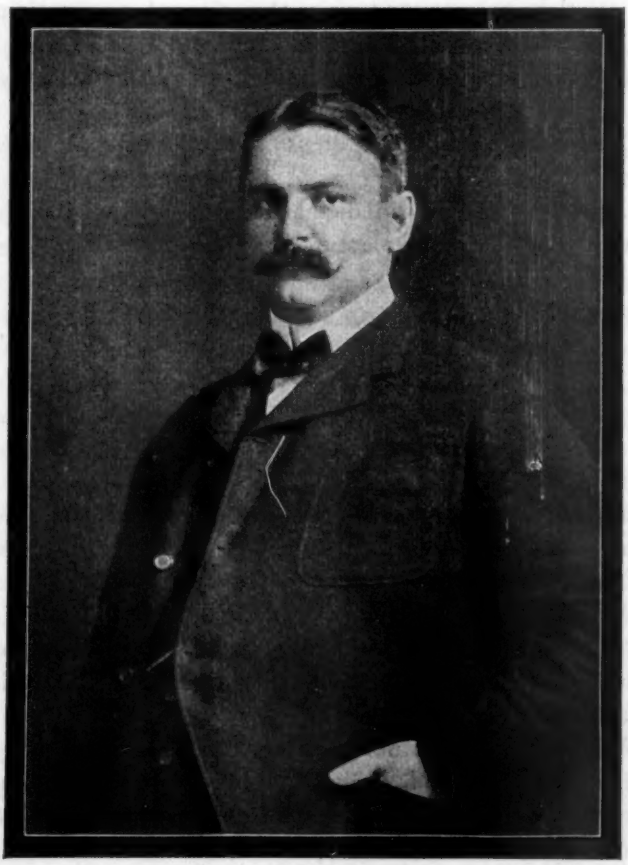
Mr. Warren was but thirty-nine years old, and his rather sudden taking off right in the prime of life and when he had barely reached the meridian splendor of a really remarkable career, makes his death a peculiarly sad one.

Mr. Warren was a Southerner by birth, his father having been the late Major Archibald Warren, of the Confederate Army. At the age of seventeen he entered the employ of Parke, Davis & Co.'s branch house in New York, his parents having meanwhile moved North. He rose rapidly in the estimation of the firm, and in 1886 was called to their headquarters in Detroit, where, after successive promotions, he became general manager in 1896.

During these seven years of management the firm has not only encircled the globe in their establishment of new branches, but have made their foundations more secure, by the development of a rather

unique co-operative system among their employees, not to speak of numerous advances in other ways.

While we thus make record of the signal success attained by Mr. Warren in his business career, we turn for a moment to the man to see wherein lay the secret of his power, and are glad to note that it was in part due to his magnanimity and kindliness of disposition.



WILLIAM M. WARREN.

In 1893 Mr. Warren was married to Miss Mary C. Buhl, daughter of Theodore D. Buhl, a capitalist of Detroit. Mrs. Warren died three years ago. A daughter, Elizabeth Buhl Warren, aged nine, survives her parents.

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